leaves the ground in May, . . . and the frost does not appear in the fall until about September 20." Mr. F. S. Lawrence's experiences with wheat in the Peace River country (latitude 58½° N.) provide valuable information (pp. 101–105). Spring wheat has fully matured here in eighty-six days. The word "muskeg" is used freely by witnesses, and is not very lucidly explained on p. 123; it appears to be a poor wet kind of soil, which may be as much as 6 feet in depth, and is generally to be avoided.

The simple and unvarnished statements of the various witnesses furnish a manly contrast with the prospectuses of company-promoters, and from them we gather that timber and minerals will probably form the main attraction for new settlers. The evidence of Mr. A. von Hamerstein (pp. 36–43) is full of delightful touches. Like Mr. Lawrence, he speaks highly of the Peace River valley, but remarks sadly of the climate of the Athabaska district:—"They say it may change, but up to this time it has not changed." He mentions places where small areas of good soil occur, but says that at Fort Chipewyan "a little garden stuff is raised, on soil brought there by the Sisters in pails." His account of the moral defects of the wolverine, among which is an objection to taking poison, should delight the naturalist. This animal has hung behind in the march of evolution, for "the horse and other animals have developed, but the wolverine has kept his original shape."

We close the book with renewed admiration for those who are engaged in making Canada. There is to be no "boom"; no hardships are to be concealed; the settler is invited to follow the trapper and the Indian, and to see if he can make more out of this enormous tract than they have done. In latitudes below those of Stockholm and the Orkneys, or even as far south as Belfast or Newcastle-upon-Tyne, he is called on to meet the rigours of a continental winter. But he is encouraged by diagrams showing the length of summer days and the shortness of summer nights, themselves as starless as the days; and the cover that encloses so much plain speaking is labelled "Canada's Fertile Northland." Success should surely come to those who have this high faith, and tell no untruths while spreading it.

G. A. J. COLE.

OUR BOOK SHELF.

The Functional Inertia of Living Matter. A Contribution to the Physiological Theory of Life. By Dr. D. F. Harris. Pp. xi+136. (London: J. and A. Churchill, 1908.) Price 5*s.* net.

THE book before us deals, mainly from the physiologico-philosophical standpoint, with a property of living matter which has excited the interest of biologists, and which, indeed, has been the field, not only of much speculation, but also of much experiment. The fact that certain forms of living matter, whether they are integral parts of a highly-developed and differentiated organism, or whether they consist of more or less apparently undifferentiated protoplasm, either do not respond at all or respond only after varying intervals of time to certain stimuli has long been known, and the condition of the protoplasm in question during this time has long been investigated by biologists. We use the term *apparently* undifferentiated advisedly, since, as has been often pointed out, it is sometimes a matter of extreme difficulty to know whether, when dealing with the infinitely simple, we are not really dealing with the infinitely complex.

Dr. Harris's brochure is an elaborate, for the most part literary, examination of this subject, and quite apart from the conclusions he draws from his investigations is of considerable interest, and will well repay the reading. In a short review of this nature it would be quite impossible to consider in even approximate detail the facts related in the book, the observations upon which they rest, or the interpretations to which they are open. The property of living matter upon which the non-response to stimuli or the so-called latent period preceding response depends is termed by the author functional inertia. He at first introduces this term, so well known and accurately applied by physicists, somewhat apologetically, as perhaps complicating physiological nomenclature; in reviewing the literature of the subject, however, he finds many precedents for the use of the term inertia as describing the resistance offered by living matter to any change in its condition. Perhaps to others, as was actually the case to the reviewer, the first cause to occur to one's mind, of failure on the part of living matter to react to stimuli, is fatigue. Dr. Harris discusses fatigue and its bearing upon functional inertia.

In a short summary the author postulates that functional inertia is as fundamental, primary, and primitive a property of protoplasm as its opposite, irritability, and that the phenomena of vitality cannot be adequately conceived in one of these properties exclusively.

We would conclude our remarks upon Dr. Harris's work by simply saying that it is interesting and suggestive, and well worthy of careful perusal, not only by those interested in the many observations relating to the phenomena of the latent period accompanying the stimulation of living matter, but also by those interested in the larger if less accurately conditioned field of biophysical philosophy. F. W. T.

The Elementary Theory of the Symmetrical Optical Instrument. By J. G. Leathem. Cambridge Tracts in Mathematics and Mathematical Physics, No. 8. Pp. vi+74. (Cambridge: University Press, 1908.) Price 2*s.* 6*d.* net.

MAKING a Cambridge tract is a feat, performed in this instance with a finish of which the writer may well be immensely proud. The Gauss theory of refraction through a series of media bounded by spherical surfaces having the same optic axis admits of being handled with that deftness which is the most marked characteristic of the Cambridge mathematician, and which is here admirably exemplified. All the essentials of the Gauss theory are condensed into some fifty octavo pages, and so clearly set out that the average mathematical student should have no difficulty in absorbing the whole in a few hours, to forget it, not impossibly, with equal readiness.

For, in spite of some reference to concrete instruments and some remarks on certain facts of observation not generally recognised, the book remains —unavoidably, perhaps, in view of its aim and its limited space—essentially academic. It will be grateful to the student, and appreciated by the mathematician already familiar with the matter it presents, but we fear there are few designers of symmetrical optical instruments, in this country at least, to whom it will appear attractive—in spite of the avoidance of the now familiar continued fraction. In its very

conciseness it assumes a mathematical training which many of them have never had, and which is much more difficult to acquire even than a knowledge of continued fractions. In some measure, no doubt, it is they who are at fault, and certainly they are the losers.

Such criticism is, obviously, to some extent beside the mark. But it recurs inevitably with the appearance of each fresh Cambridge text-book on geometrical optics. An excellent book; but if only the author had written something which would more obviously advance the practice of optics and the manufacture of optical instruments!

To our mind, the most interesting part of this admirable little tract is contained in sections ix. and x. Section ix. gives a simple and concise explanation of the occurrence and physical importance of von Seidel's five third-order aberrations, very palatable and nutritious for the mathematician! And in section x. is to be found an up-to-date abstract of the elementary theory of the characteristic function, which will be helpful to many. The contents of the tract will have been sufficiently indicated if we add that the titles of sections vii. and viii. are respectively "Entrance and Exit Pupils" and "Chromatic Defects of the Image."

In conclusion, we venture to assert that Mr. Leathem's exposition of the Gauss theory will be adopted as the most serviceable by every optician who takes the trouble to become familiar with this book, and we would add that he will find his trouble well repaid.

Hints for Crystal Drawing. By Margaret Reeks. With a preface by Dr. John W. Evans. Pp. xx+148; with 5 figures and 44 plates. (London: Longmans, Green and Co., 1908.) Price 3*s.* 6*d.* net.

THE importance of accurate drawings of crystals in any crystallographical discussion was recognised by Haüy, the father of crystallography, but the principles upon which such drawings should be made were not clearly explained until the publication by Haidinger of his well-known paper among the memoirs of the Wernerian Society many years later. It is essential that edges which are parallel on the crystal should be represented by parallel lines on the drawing, a condition which entails the supposition that the eye views the crystal from an infinite distance. Consequently, in such a special case as a skeletal cube in which the edges are drawn of equal thickness, the eye would be puzzled as to which is the front, and the cube would appear constantly to be turning inside out; but, as a rule, no such ambiguity would arise. It is also important that the directions of the edges in the drawing should be determined with mathematical precision, even when the crystal is shown in perspective.

In this book Miss Reeks presents Naumann's modification of Haidinger's method. She explains how the projection of the fundamental axial system may be found graphically in the six different systems, and discusses many examples, all of which are illustrated by full working details. It might have been made clearer on p. 7 that the particular rotations employed to give the customary perspective were adopted, not haphazardly, but because the tangents of the angles have the simple ratios given. The student who carefully reads this book cannot fail to master the principles of the method with which it deals; the author's exposition is lucid, and the illustrations, which have been reproduced from her own drawings, are admirable. It may, however, be questioned whether in most cases it be not quicker and easier to draw a crystal from a stereographic or a gnomonic projection by the method devised by Goldschmidt, which was fully explained to English readers by Penfield in one of his illuminating papers.

House-painting, Glazing, Paper-hanging, and White-washing. A Book for the Householder. By A. H. Sabin. Pp. v+121. (New York: John Wiley and Sons; London: Chapman and Hall, Ltd., 1908.) Price 4*s.* 6*d.* net.

MR. SABIN may be known to some readers of NATURE as the author of a pleasantly discursive volume on the technology of paint and varnish. In the present little work he expounds one branch of that technology for the benefit of householders. He describes simply and plainly how to use various preservative coatings in the protection and embellishment of ordinary dwelling-houses.

There is no chemistry in the book, but a chemist tells of the materials to use—of the white lead, turpentine, oil, driers, putty, varnish, and whitewash—as also of the points to note and the pitfalls to avoid in applying the preparations. Whether many householders will benefit is perhaps doubtful. Possibly, in America, where isolated homesteads are more frequent, the householder may be more often than in this country tempted to do his own painting and papering. Here it would rarely seem worth while. There is a proverb about spoiling a horn and not making a spoon, and probably the unskilled user of paint, paper, and varnish would generally do well to get his work done better by a trained craftsman. Even so, however, there is no harm in knowing what are the best materials, how to get the most durable results, and the general why and wherefore of the matter. For anyone who contemplates either trying his own skill or overlooking the proceedings of a workman, Mr. Sabin's book appears, as he claims in the preface, to "set forth fairly safe and sound practice."

C. S.

Mountain Panoramas from the Pamirs and Kuen Lun. Photographed and annotated by Dr. M. Aurel Stein. Pp. 36. (London: Royal Geographical Society, 1908.)

WHEN Dr. Stein visited Central Asia in 1900–1, to explore the ruined cities of Chinese Turkestan, he included in his equipment a phototheodolite, with which a number of panoramas were taken. These not only served as a basis for the production of a map, but gave an excellent idea of the character of the country passed through. The Royal Geographical Society has now published a selection from them which will prove of interest to both geographers and geologists. A feature common to a large number of the photographs is the manner in which they illustrate the progressive desiccation of the region lying north of the Himalayas; the sharp crested ridges, separating deeply-cut valleys, produced by the action of rain and rivers, are seen to be gradually merging into rounded contours under a growing mantle of wind-borne loess. We may also direct attention to the remarkably perfect specimens of embankment moraines in the Ab-i-Panja valley, where glaciers, now vanished, have advanced into the main valley over embankments of the *débris* which they have carried along with them.

Thomas Linacre. By Dr. William Osler, F.R.S. Pp. vi+64. (Cambridge: The University Press, 1908.) Price 2*s.* 6*d.* net.

THIS little volume is the text of the Linacre lecture for 1908, the first under the new regulations. Prof. Osler begins by recapitulating the few facts